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EXAMINER				
FAULK, DEVONAE				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/815,591

**Applicant(s)**

BAUMGARTE ET AL.

**Examiner**

DEVONA E. FAULK

**Art Unit**

2615

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 July 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 3-19, 21, 23-25 and 27-52 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1, 3-19, 43-47, 51 and 52 is/are allowed.
- 6) ☒ Claim(s) 21, 41, 42 and 48-50 is/are rejected.
- 7) ☒ Claim(s) 23-25 and 27-40 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Response to Arguments***

1. Claims 2-14,16,18,19,23-33,35,38-40 were objected to as being dependent upon a rejected base claim in the previous office action and indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
2. The indicated allowability of claim 26 is withdrawn in view of the newly discovered reference(s) to Budnikov. Rejections based on the newly cited reference(s) follow.
3. The applicant has amended claims 1 and 21 with indicated allowable subject matter.
4. The applicant has added new claims 41-52 which are comprised of claims 1 or 21 and one or more of the indicated allowable subject matter of claims 2-14,16,18,19,23-33,35,38-40.
5. Claims 2,20,22 and 26 are cancelled.

***Claim Objections***

6. Claims 23-40,44 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
- 7.

***Claim Rejections - 35 USC § 112***

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. The term "substantially" in claim 50 is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lowe et al. (US 5,371,799).

Regarding claim 1, Lowe discloses a method of synthesizing an auditory scene, comprising:

Processing at least one input channel to generate two or more processed input signals (Figure 5, input audio sample is fed in through terminal 90 to be processed through azimuth processor 92 and two or more processed input signals are generated; column 5, lines 49-57);

Filtering the at least one input channel to generate two or more diffuse signals (range processor 102, filters the input channel and performs processing on the early reflections part of the audio signal to generate two or more diffused signals; Figure 5; column 6, lines 7-14);

Combining the two or more diffuse signals with the two or more processed input signals to generate a plurality of output channels for the auditory scene (adders 98 and 100, Figure 5).

Lowe's azimuth process is comprised of several filters (column 5, lines 63-66).

MPEP 2114....states that while features of an apparatus may be recited either structurally or functionally, claims <directed to >an< apparatus must be distinguished from the prior art in terms of structure rather than function. Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Filters are capable of converting from a time domain to a frequency domain. Therefore, Lowe has the structural limitations of the claim regarding the processing at least input channel as recited and the intended use of the filters cannot differentiate the claimed apparatus from the prior art.

Regarding delaying the FD input signals and scaling the delayed FD signals the examiner takes official notice that delaying and scaling signals are well known in the art and it would have been obvious to delay the FD signals and scale the FD signals for the benefit of reducing the frequency dependency of the system.

Regarding claim 15, Lowe discloses wherein the method generates more than two output channels from the at least one input channel (Figure 5; See Lowe as applied above to claim 1).

Regarding claim 17, Lowe discloses wherein a single input channel is used to synthesize the auditory scene (Figure 5, Figure 5, input audio sample is fed in through terminal 90 to be processed through azimuth processor 92 and two or more processed input signals are generated; column 5, lines 49-57).

12. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Budnikov et al. (US 2005/0069143) in view of Hasebe (US 6,658,117).

Regarding claim 21, Budnikov discloses a configuration of at least one time domain to frequency domain (TD-FD) converter (FFT, 212, Figure 2) and a plurality of filters (source image processors 216a-216n operate to apply an appropriate one of filters 215a-215n to each of the selected transformed window that has been matched to a reverberation path and that has been assigned for processing by a source image processing kernel; processing is performed in accordance with parameters established by the filter that corresponds to the reverberation path; page 3, ¶ 0028 -¶ 0030), the configuration adapted to generate two or more processed FD input signals and two or more diffuse signals from at least one TD input channel;

Two or more combiners adapted to combined the two or more diffuse FD signals with the two or more processed FD input signals to generate a plurality of synthesized FD signals (each of the plurality of source image processors 216a-216n reads on combiners, Figure 2; page 3, ¶ 0028 -¶ 0030); and

Two or more frequency domain to time domain (FD-TD) converters adapted to convert the synthesized FD signals into a plurality of TD output channels for the auditory scene (IFFT, 217c, 218c; page 4, ¶ 0034- ¶ 0035 discloses that the output is coupled to a loudspeaker system, headphone set or other audio display devices), wherein:

The configuration comprises:

a first TD-FD converter adapted to convert the at least one TD input channel into a plurality of FD input channels (FFT 212 is adapted to transform each of the timewise windows created by input stage 211 to a frequency domain equivalent; ¶ 0026);

a plurality of delay nodes adapted to delay the FD input signals to generate a plurality of delayed FD signals ( buffers 214a-214n each stores one of the frequency transformed windows. The buffers adequate to insert a delay of one second, ¶ 0026 and additionally in the source image processors each output frequency domain reverberant signal that corresponds to a delayed and attenuated version of a source image associated with each path ¶ 0031 ).

Budnikov teaches of a plurality of frequency dependent signals;

the combiners are adapted to sum, for each output channel, one of the delayed FD signals and a corresponding one of the diffuse FD signals to generate one of the synthesized FD signals (Figure 2; page 3, ¶ 0028 -¶ 0030).

Budnikov fails to teach explicitly of a plurality of multipliers adapted to scale the FD signals to generate a plurality of scaled, delayed FD signals . Using

multiple multipliers each corresponding to scale a different signal is known in the art as taught by Hasebe. Hasebe discloses multipliers 11-14 applied to each individual signal (Figure 1; column 5, lines 23-25). It would have been obvious to modify Budnikov by having multipliers adapted to scale the FD signals for the benefit of providing scaled frequency dependent signals.

Regarding claim 34, Budnikov discloses wherein the apparatus is adapted to generated more than two output channels from the at least one TD input channel (See Budnikov as applied above to claim 21).

Regarding claim 36, Budnikov discloses where the apparatus is adapted to use a single input channel to synthesize the auditory scene (Figure 2; page 5, claim 1, line 2).

Regarding claim 37, Budnikov discloses wherein the apparatus comprises one filter for every output channel in the auditory scene (IFFT 217c and 218 c , see as applied above to claim 21).

13. Claims 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lowe et al. (US 5,371,799).

Regarding claims 41, Lowe discloses a method of synthesizing an auditory scene, comprising:

Processing at least one input channel to generate two or more processed input signals (Figure 5, input audio sample is fed in through terminal 90 to be processed



through azimuth processor 92 and two or more processed input signals are generated; column 5, lines 49-57);

Filtering the at least one input channel to generate two or more diffuse signals (range processor 102, filters the input channel and performs processing on the early reflections part of the audio signal to generate two or more diffused signals; Figure 5; column 6, lines 7-14);

Combining the two or more diffuse signals with the two or more processed input signals to generate a plurality of output channels for the auditory scene (adders 98 and 100, Figure 5), wherein:

the method generates more than two output channels from the at least one input channel (Figure 5).

Lowe discloses that the method synthesizes a stereo sound auditory scene.

Lowe fails to disclose that the method synthesizes a surround sound auditory scene.

However, MPEP 2114....states that while features of an apparatus may be recited either structurally or functionally, claims <directed to >an< apparatus must be distinguished from the prior art in terms of structure rather than function. Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Lowe has the structural limitations of the claim and the intended use of the filters cannot differentiate the claimed apparatus from the prior art.

All elements of claim 42 are comprehended by the rejection of claim 41.

14. Claims 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Budnikov et al. (US 2005/0069143).

Regarding claim 48, Budnikov discloses a configuration of at least one time domain to frequency domain (TD-FD) converter (FFT, 212, Figure 2) and a plurality of filters (source image processors 216a-216n operate to apply an appropriate one of filters 215a-215n to each of the selected transformed window that has been matched to a reverberation path and that has been assigned for processing by a source image processing kernel; processing is performed in accordance with parameters established by the filter that corresponds to the reverberation path; page 3, ¶¶ 0028-¶¶ 0030), the configuration adapted to generate two or more processed FD input signals and two or more diffuse signals from at least one TD input channel;

Two or more combiners adapted to combined the two or more diffuse FD signals with the two or more processed FD input signals to generate a plurality of synthesized FD signals (each of the plurality of source image processors 216a-216n reads on combiners, Figure 2; page 3, ¶¶ 0028-¶¶ 0030); and

Two or more frequency domain to time domain (FD-TD) converters adapted to convert the synthesized FD signals into a plurality of TD output channels for the auditory scene (IFFT, 217c, 218c; page 4, ¶¶ 0034- ¶¶ 0035

discloses that the output is coupled to a loudspeaker system, headphone set or other audio display devices),

Budnikov discloses that the method synthesizes a stereo sound auditory scene and that the output can be a loudspeaker system (page 4, ¶ 0035) .

Budnikov fails to disclose that the method synthesizes a surround sound auditory scene.

However, MPEP 2114....states that while features of an apparatus may be recited either structurally or functionally, claims <directed to >an< apparatus must be distinguished from the prior art in terms of structure rather than function. Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987).

Budnikov has the structural limitations of the claim and the intended use of the filters cannot differentiate the claimed apparatus from the prior art.

All elements of claim 49 are comprehended by the rejection of claim 48.

Regarding claim 50, Budnikov discloses a configuration of at least one time domain to frequency domain (TD-FD) converter (FFT , 212, Figure 2) and a plurality of filters (source image processors 216a-216n operate to apply an appropriate one of filters 215a -215n to each of the selected transformed window that has been matched to a reverberation path and that has been assigned for processing by a source image processing kernel; processing is performed in accordance with parameters established

by the filter that corresponds to the reverberation path; page 3, ¶¶ 0028 -¶¶ 0030), the configuration adapted to generate two or more processed FD input signals and two or more diffuse signals from at least one TD input channel;

Two or more combiners adapted to combined the two or more diffuse FD signals with the two or more processed FD input signals to generate a plurality of synthesized FD signals (each of the plurality of source image processors 216a-216n reads on combiners, Figure 2; page 3, ¶¶ 0028 -¶¶ 0030); and

Two or more frequency domain to time domain (FD-TD) converters adapted to convert the synthesized FD signals into a plurality of TD output channels for the auditory scene (IFFT, 217c, 218c; page 4, ¶¶ 0034- ¶¶ 0035 discloses that the output is coupled to a loudspeaker system, headphone set or other audio display devices),.

Budnikov fails to disclose that each filter has a random frequency response with a flat spectral envelope.

The examiner asserts that each filter implicitly has a frequency response and that it is a matter of design choice as to the filter having a flat spectral envelope. It would have been obvious to modify Budnikov so that each filter has a flat spectral envelope for the benefit or providing a better sound environment for the user.

***Allowable Subject Matter***

15. Claims 1,3-19,45-47,51,52 allowed.

16. The following is an examiner's statement of reasons for allowance: Regarding claims 1, and 43 prior art Lowe (US 5,371,799), discloses a method of synthesizing an auditory scene, comprising processing at least one input channel to generate two or more processed input signals (Figure 5, input audio sample is fed in through terminal 90 to be processed through azimuth processor 92 and two or more processed input signals are generated; column 5, lines 49-57); filtering the at least one input channel to generate two or more diffuse signals (range processor 102, filters the input channel and performs processing on the early reflections part of the audio signal to generate two or more diffused signals; Figure 5; column 6, lines 7-14); combining the two or more diffuse signals with the two or more processed input signals to generate a plurality of output channels for the auditory scene (adders 98 and 100, Figure 5), wherein: the method generates more than two output channels from the at least one input channel (Figure 5). Lowe discloses that the method synthesizes a stereo sound auditory scene.

17. Regarding claims 45 and 51, prior art Budnikov et al. (US 2005/0069143) discloses a configuration of at least one time domain to frequency domain (TD-FD) converter (FFT, 212, Figure 2) and a plurality of filters (source image processors 216a-216n) operate to apply an appropriate one of filters 215a-215n to each of the selected transformed window that has been matched to a reverberation path and that has been assigned for processing by a source image processing kernel; processing is performed in accordance with parameters established by the filter that corresponds to the reverberation path; page 3, ¶ 0028 -¶ 0030), the configuration adapted to generate two or more processed FD input signals and two or more diffuse signals from at least one

TD input channel; two or more combiners adapted to combined the two or more diffuse FD signals with the two or more processed FD input signals to generate a plurality of synthesized FD signals (each of the plurality of source image processors 216a-216n reads on combiners, Figure 2; page 3, ¶ 0028 -¶ 0030); and two or more frequency domain to time domain (FD-TD) converters adapted to convert the synthesized FD signals into a plurality of TD output channels for the auditory scene (IFFT, 217c, 218c; page 4, ¶ 0034- ¶ 0035 discloses that the output is coupled to a loudspeaker system, headphone set or other audio display devices).Budnikov discloses that the method synthesizes a stereo sound auditory scene and that the output can be a loudspeaker system (page 4, ¶ 0035).

Regarding claim 1, the prior art or combination thereof fails to disclose or make obvious converting the at least one input channel from a time domain into a frequency domain to generate a plurality of frequency-domain input signals.

Regarding claims 43 and 51, the prior art or combination thereof fails to disclose or make obvious the method applies the processing , filtering, and combining for input channel frequencies less than a specified threshold frequency and applies alternative auditory scene analysis processing for input channel frequencies greater than the specified threshold frequency (claim 43) and the apparatus is adapted to generate, combine, and convert for TD input channel frequencies less than a specified threshold frequency and the apparatus is further adapted to apply alternative auditory scene synthesis processing for input channel frequencies greater than the specified threshold frequencies.

Regarding claim 45, the prior art or combination thereof fails to disclose or make obvious the delay nodes are adapted to delay the FD input signals based on inter-channel time difference data and the multipliers are adapted to scale the delayed FD signals based on inter-channel level difference and inter-channel correlation data. Claims 3-20,44,46-47 and 52 are allowed due to dependencies on claims 1,43,45 and 51.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEVONA E. FAULK whose telephone number is (571)272-7515. The examiner can normally be reached on 8 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devona E. Faulk/  
Examiner  
Art Unit 2614  
10/10/2008